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EXAMINER	
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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/032,606
Filing Date: October 19, 2001
Appellant(s): KEEGAN ET AL.

Jaeckle Fleischmann & Mugel, L.L.P.
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 10/29/04.

(1) Real Party in Interest

A statement identifying the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

A statement identifying the related appeals and interferences which will directly affect or be directly affected by or have a bearing on the decision in the pending appeal is contained in the brief.

(3) Status of Claims

The statement of the status of the claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

The following is a listing of the evidence (e.g., patents, publications, Official Notice, and admitted prior art) relied upon in the rejection of claims under appeal.

2002/0098400 Mieney et al 07-2002

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claim 2 is are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Mieney et al 2002/0098400.

With respect to claim 2:

Mieney et al teach a fuel cell comprising a fuel cell unit including a cathode; an anode and an electrolyte disposed between the cathode and the anode (CLAIM 2). The fuel cell is a solid oxide fuel cell (SECTION 0040). It is also disclosed that the fuel cell unit includes an inlet and an outlet coupled to the fuel cell unit; a reducing gas supply supplying gas for actuating the actuator and for regulating gas to the fuel cell unit (CLAIM 1).

Mieney et al further describe disposing an electrochemical cell having the anode, the cathode and the electrolyte, disposing control valves having first opening with a reducing gas supply having variable pressure and a second opening in fluid communication therewith; disposing a flow of oxidant to the cathode(SECTION 0040); disposing the reducing gas in fluid communication with the anode; actuating an actuator in the control valve with the variable gas supply pressure, and regulating the flow of reducing gas to the electrochemical cell by varying the gas supply pressure and controlling the flow of the reducing gas being pumped to the anode for preventing anode oxidation; the reducing gas comprises hydrogen (SECTION 0040). Therefore, the pressure of hydrogen is being regulated to control the power generated through electrochemical conversion by the fuel cell.

Figure 2 below illustrates an solid oxide electrochemical fuel cell in operation producing a current flow as shown by current flow arrows 60 and 60'. Oxidant gases, such as oxygen or air, can be introduced to the cathode side of the cell, flowing as illustrated by the oxidant flow arrows 64, 64' and 64". The reaction of the fuel and oxide ions, producing electrons (e-), which

flow outside of the electrochemical cell 10 to the external circuit 70 and back to the cathode 50 (SECTION 0024). At the anode, the oxide ions react with a fuel, such as hydrogen which as introduced to the electrochemical cell 10 as illustrated by the fuel flow arrows 62, 62' and 62" (SECTION 0025). It is further disclosed that the electrolyte 40 conducts these oxides ions (O^{-2}) between the anode 30 and the cathode 50, maintaining an overall electrical charge balance. The cycle of flowing electrons (e-) from the anode 30 through the external circuit 70 to the cathode 50 creates electrical energy for harnessing (SECTION 0027). Mieney et al teach that an end cap 20 includes a surface 22 that is configured for disposal adjacent to the anode 30 to provide fuel distribution; and an interconnect 24 includes a first interconnect surface 26 which is configured adjacent to the cathode 50 to provide oxidant distribution (SECTION 0019). It is also disclosed that oxide ions flow through the electrolyte 40 (SECTION 0029 & 0020). Therefore, considering that anode 30, cathode 50 and the solid electrolyte 40 each has a three dimension structure (volume or 3D), it is contended that fuel and oxidant distribution flow areas represented by reference numerals 66 (the fuel stream arrow), reference numeral 62, 62' and 62" (the fuel flow arrows), reference numeral 68 (the oxidant stream arrow) and reference numeral 64, 64' and 64" (the oxidant flow arrows), respectively, are generally non-parallel and/or orthogonal (intersecting or lying at right angles or having perpendicular slopes or tangents at the point of intersection) to the flow of oxygen ions (O^{-2}) through the electrolyte 40 as illustrated below in Figure 2. In particular, fuel flow arrows 62, 62' and 62" and oxidant flow arrows 64, 64' and 64" are non-parallel to the oxygen ions flow; and fuel stream arrow 66 and oxidant stream arrow 68 are orthogonal to the flow of oxygen ions.

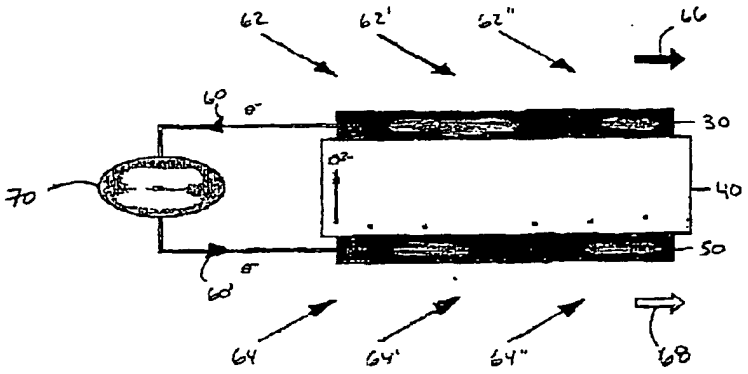

FIGURE 2

Examiner's note: As to the limitation that "resistance to the flow of electric current through the cell is non-uniform over a flow area of the cell" or "the electrical resistance is non-uniform over one of said anode, cathode or electrolyte", it is contended that the electrical resistance of any body is intrinsically related to the chemical nature of its construction material, therefore, since the construction material of each of the fuel cell components i.e. the anode, the cathode, the electrolyte, the separator; the end plate and the likes differs from one another, any fuel cell will exhibit non-uniform resistance to the flow of electric current through the cell over the areal extent thereof or over the anode, the cathode or the electrolyte. Accordingly, each fuel cell component presents a varied appearance of electrical resistance pattern due to its material composition. In addition, given that (as disclosed by the applicant, see specification at page 3, lines 17-22) the resistance is higher in areas of the cell having locally low levels of hydrogen than in areas having locally high levels of hydrogen, that is to say, the higher the concentration of hydrogen the lower the resistance is at a local fuel cell point/site, it is thus contended that hydrogen concentrations (level) inherently varies from the anode inlet to the anode active area and all over along the anode outlet, that is to say, the hydrogen concentration at a local anode point such as the inlet is different, due to hydrogen consumption or elimination, than the

hydrogen concentration at another local anode point such as the outlet. This also applies to the cathode active area, including the inlet and the outlet but, of course, using oxygen instead of hydrogen as the flowing fluid. Thus, it is asserted that having shown that the construction material of each particular fuel cell component is chemically different from each other as well as a necessary variation or gradients in hydrogen concentration along the anode surface itself, the above-mentioned characteristic, property and/or function is hence inherent as the construction material of fuel cell components (i.e. the solid oxide electrolyte) and the fuel cell structural configuration recited in the reference is substantially identical to that of the claims, and therefore, claimed properties, characteristics or functions are presumed to be inherent (MPEP 2112. Requirements of Rejection Based on Inherency). Thus, the prior art fuel cell seems to be identical except that the prior art is silent as to an inherent function, property and/or characteristic. In that, it is noted that the extrinsic evidence makes clear that the missing descriptive matter is necessarily present in fuel cell described in the reference, and that it would be so recognized by persons of ordinary skill.

Therefore, Mieney et al anticipate the claim. However, if the claims are not anticipated the claims are obvious as it has been held similar products claimed in terms of its function, property and/or characteristic are obvious. In re Best 195 USPQ 430 and In re Fitzgerald 205 USPQ 594. See rationale and/or technical reason above to reasonably support the determination that the inherent function, property and/or characteristic necessarily flows from the teaching of the applied prior art.

(10) Response to Argument

Appellant's arguments have been fully considered but they are not persuasive.

The assertion that the prior art of record does not teach or suggest the "the electrical resistance is non-uniform over one of said anode, cathode or electrolyte" is respectfully disagreed with for the reasons below.

In this regard, it is contended that the electrical resistance of any body is intrinsically related to the chemical nature of its construction material. Therefore, since the construction material of each of the fuel cell components i.e. the anode, the cathode, the electrolyte, the separator, the end plate and the likes differs from one another, any fuel cell will exhibit non-uniform resistance to the flow of electric current through the cell over the areal extent thereof or over the anode, the cathode or the electrolyte. Accordingly, each fuel cell component presents a varied appearance of electrical resistance pattern due to its material composition.

Additionally, the examiner likes to clarify his position regarding the specific non-uniform characteristic of either the anode, the cathode or electrolyte. In that, it is the examiner's position that the breadth of the present claim language allows for an all-encompassing interpretation of the claims and therefore, the non-uniform characteristic. In particular, appellant has simply claimed the limitation that the electrical resistance is non-uniform over one of said anode, cathode and electrolyte. However, given that the present claim language fails to positively set forth what specific anode, cathode or electrolyte characteristic (e.g. the thickness, composition, porosity and the likes) is altered or modified to obtain such non-uniform limitation; and the specification is devoid of the particular degree of non-uniformity over the anode, the cathode and the electrolyte, the examiner has given the claim language its broadest reasonable interpretation (← *emphasis added*→). In this respect, it is strenuously contended that the instant claim language (i.e. non-uniform) *reads on* any minute, minuscule, infinitesimal or microscopic variation of

uniformity in a cathode body, anode body or electrolyte body for any given point or length-by-width-by depth (from point-to-point regardless of their dimension). Therefore, realistically speaking, no manufacturing method or industrial process is capable of producing or making a body being 100 % uniform without having at least very minute or diminutive variations on any given body characteristic or property. That is to say, all manufacturing methods or industrial process for producing a manufactured product require standardized quality control parameters based on the product characterization, product specifications and the desirable degree of tolerance, deviation and variance of the final manufacture product (body) (← *emphasis added*). In other words, no manufacturing method or industrial process can assure an uniform product exhibiting a 0 % of deviation at all and a 100 % of tolerance at all of any given characteristic thereof at manufacturing time. In consequence, given that the present claim language is silent as to what specific cathode, anode or electrolyte characteristic is non-uniform (e.g. the thickness, composition, porosity and the likes), it is believed that the position presented above with respect to the broadest reasonable interpretation based on any minuscule, infinitesimal or microscopic variation of uniformity in a cathode body, anode body or electrolyte body is sound.

Furthermore, appellant has taken the position that because the prior art of record fails to expressly or explicitly disclose the anode, cathode or electrolyte are non-uniform, thus, they are inherently uniform (← *emphasis added*). To be precise, appellant's position is that the anode, cathode and/or the electrolyte of the prior art are inherently uniform because they are not inherently non-uniform. It is believed that appellant's position is unreasonable and contradictory itself because it establishes an unfair double standard of arguing the positive presence of an inherent uniform characteristic to then contest the lack of an inherent non-uniform characteristic.

Moreover, the risk to allow that such a claim limitation (i.e. "non-uniform" per se) be patentable over this examiner's analysis and without openly setting forth a discernable body characteristic exhibiting the non-uniform attribute is equivalent to virtually believe that no manufacturing *defects* do exist; that there is no allowable deviation from a standard; or that there is no range of variation permitted in maintaining a specified dimension/characteristic in processing an article/product (← *emphasis added*). Succinctly stated, it might open the window to accept as true the making or manufacture of entirely perfect manufacturing goods by overlooking known manufacturing concerns regarding product reproducibility, repeatability, deviation, tolerance, robustness and quality.

While applicants' reliance on the argument that the Mieney reference does not teach or suggest providing one of the anode, cathode and electrolyte with non-uniform electrical resistance might be valid, the fact is that nothing in the Mieney reference teaches or suggest providing one of the anode, cathode and electrolyte with uniform electrical resistance, too. Thus, the examiner has a reasonable basis to suspect that Mieney's cathode, anode or electrolyte can exhibit either uniform electrical resistance or non-uniform electrical (← *emphasis added*). Thus, in the absence of factual evidence demonstrating that Mieney's cathode, anode or electrolyte exhibit one characteristic or the other, the above-mentioned examiner's position with respect to the specific electrical resistance (i.e. uniform or non-uniform) still stands for the reasons of record. In view of that, the examiner also asserts that it is not enough that applicant's representative personally believe that the prior art does not exhibit non-uniform electrical resistance characteristic to teach such inherently identified characteristic and/or property. That is to say, the arguments of counsel cannot take the place of evidence in the record. An assertion of

what seems to follow from common experience is just attorney argument and not the kind of factual evidence that is required to rebut a prima facie case of inherent anticipation/obviousness (*See MPEP 2145 Consideration of Applicant's Rebuttal Arguments*).

Moreover, given that (as disclosed by the applicant, see specification at page 3, lines 17-22) the resistance is higher in areas of the cell having locally low levels of hydrogen than in areas having locally high levels of hydrogen, that is to say, the higher the concentration of hydrogen the lower the resistance is at a local fuel cell point/site, it is thus contended that hydrogen concentrations (level) inherently varies from the anode inlet to the anode active area and all over along the anode outlet, that is to say, the hydrogen concentration at a local anode point such as the inlet is different, due to hydrogen consumption or elimination, than the hydrogen concentration at another local anode point such as the outlet. This also applies to the cathode active area, including the inlet and the outlet but, of course, using oxygen instead of hydrogen as the flowing fluid. Thus, it is asserted that having shown that the construction material of each particular fuel cell component is chemically different from each other as well as a necessary variation or gradients in hydrogen concentration along the electrode surfaces themselves, the above-mentioned characteristic, property and/or function is hence inherent as the construction material of fuel cell components (i.e. the solid oxide electrolyte) and the fuel cell structural configuration recited in the reference is substantially identical to that of the claims, and therefore, claimed properties, characteristics or functions are presumed to be inherent (*MPEP 2112. Requirements of Rejection Based on Inherency*). Thus, the prior art fuel cell seems to be identical except that the prior art is silent as to an inherent function, property and/or characteristic. In that, it is noted that the extrinsic evidence makes clear that the missing descriptive matter is

necessarily present in fuel cell described in the reference, and that it would be so recognized by persons of ordinary skill.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

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Examiner
Art Unit 1745

Conferees:
Pat Ryan
Steve Griffin